Lufkin®

PRO SERIES

Dual Axis Laser with Gradient

LDAL310S
User Guide

COOPER Tools

A Dual Gradient Laser of extremely rugged design – for civil and construction engineering applications

High-precision Rotary Gradient Laser, 5° horizontal self-levelling range, accuracy 0,5 mm / 10 m. Gradient can be set digitally in both X and Y axes. Electronic vials and positioning motors controlled by temperature-stable sensors for automatic horizontal alignment. Highest reliability is guaranteed through the ant-drift system (ADS): The electronics permanently monitor the measuring process and switch the laser off in the case of any outside interference or disturbance. The laser beam can be switched off in sections. Laser modes: rotary and hand receiver mode. High maximum speed of 1100 rpm, the telescopic sight supplied with the device makes alignment easy, large illuminated LCD.

General safety instructions

Caution: Do not look directly into the beam. Lasers must be kept out of reach of children. Never intentionally aim the device at people. This is a quality laser measuring device and is 100% factory adjusted within the stated tolerance. For reasons of product liability, we must also draw your attention to the following: Regularly check the calibration before use, after transport and after extended periods of storage. We also wish to point out that absolute calibration is only possible in a specialist workshop. Calibration by yourself is only approximate and the accuracy of the calibration will depend on the care with which you proceed.

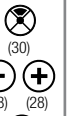
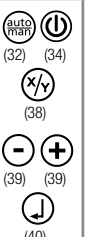
LASER RADIATION
DO NOT STARE INTO THE BEAM!
CLASS 2 LASER
< 1 mW · 635 nm
EN 60825-1:2007-10

Note:
This product is a precision instrument that must be handled and treated with care. Avoid shocks and impact. Always keep and carry in the case! Switch laser off. For cleaning, use a soft cloth and glass cleaner.

Warranty

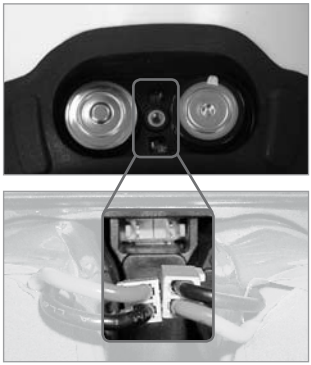
The warranty period is two years from the date of purchase. The warranty covers all material and manufacturing defects occurring during this time. The following are excluded from warranty: Damage due to improper use (e.g. connection to an unsuitable power source, falling onto a hard surface, etc); improper storage; normal wear and tear; minor defects not impairing operation. Any tampering by unauthorized persons will render the warranty void. In the event that you need to claim warranty, please return the complete device together with proof of purchase to the place of purchase or to the Service address on the back page.

Quick Reference Guide		
(34)	Switching the unit on for the first time	Switch the unit on using the ON/OFF button (34). The laser rotates at a speed of 600 rpm and the automatic sensors are active.
(37)	Remote control	The remote control can be used to control all functions except gradient entry. Standby mode is activated by pressing the standby button (37). All settings are retained.
(35)	Rotating speed	Press the rotation button (35) to switch speeds (0; 300; 600; 1100 rpm).
(27) (31) (28) (28) (29)	Digital slope function	Press the X button (27): The first digit starts to flash. Press the plus/minus buttons (28) to enter a positive, zero or negative value. Press the X button to select the values of subsequent digits. Numerical values can be set using the plus/minus buttons (28). The Y button functions in the same way as the X button. **Important:** You must confirm your entries by pressing Enter (29); the rotary laser will then set the required value. Value entry is disabled during levelling ("SLOPE" flashes on the LCD (19)). Once levelling is complete and value entry has been reactivated, "SLOPE" will stop flashing and will be displayed permanently on the LCD.
(32)	Manual slope function	This function is used to deactivate automatic levelling. Large deviations from the horizontal and vertical planes can now be set using an optional external tilt plate. To do this, press the auto/man button (32). „MAN“ will appear on the LCD (24). Note: The DualAxis-Laser is not capable of motorized slope adjustment in auto/man mode. Important: As the automatic sensors are not active, horizontal levelling is not possible.

(33)	Tilt function	Once the rotary laser has been levelled and the automatic sensors are running, press the tilt button (33). It takes approximately 30 seconds to activate tilt. If you move the unit during this time, it will switch itself off. The laser and "TILT" (22) flash. Press the tilt button again to reactivate the automatic sensors; tilt will be reactivated within approximately 30 seconds. Once the tilt function has been activated, it can be deactivated by pressing the tilt button again. **Important:** The tilt function is not active in standby mode.
 (30) (28) (28) (29)	Laser segment mode	Press the segment button (30). The top segment (21) flashes on the LCD. Use the plus/minus buttons (28) to activate/deactivate the segment. Press the segment button again to move to the next segment. Press Enter (29) to confirm the setting and transfer it to the laser.
(29)	Illuminated display	Press and hold down Enter (29) on the rotary laser for at least 2 seconds to activate/deactivate the illuminated display.
	Power management	The unit can run on rechargeable batteries, standard alkaline batteries and a mains power supply. Running the unit on a mains power supply will charge its rechargeable batteries.
 (32) (34) (38) (39) (39) (40)	Calibration	Press and hold down the auto/man button (32). With the auto/man button held down, press the ON/OFF button (34) until CAL (36) appears on the display. Open the calibration compartment on the remote control unit and select the X axis by pressing the X/Y button (38). You can now set the selected axis using the plus/minus buttons (39). Proceed in the same way to set the Y axis. Save the new setting by pressing Enter (40).

Operation of the DualAxis-Laser

Charging the batteries



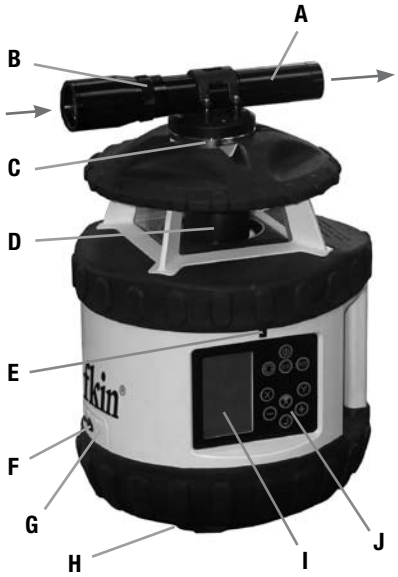
- The battery symbol (26) will flash constantly on the LCD (I) to indicate that the batteries need changing or recharging.
- Open the battery compartment (K), insert the batteries and connect the plugs to the sockets. The plugs fit in the sockets in one position only (see pictures on right). Reclose the battery compartment.
- Connect the battery charger/mains unit to a mains source and plug into the socket (F). Please only use the charger/mains unit supplied with the device. If a different one is used, the warranty will become void.
- The device can also be operated with standard alkaline batteries (4 x type D). Insert the batteries as shown by the installation symbols. Ensure the polarity is correct.

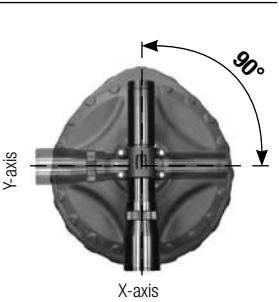
Inserting batteries into the SensoLite laser receiver

- Open the battery compartment (8) and insert the battery according to the installation symbol, making sure that you do not reverse the polarity. Replace the cover.
- In order to save battery power the receiver will switch itself off automatically after approximately 5 minutes of inactivity.

Note:

Do not expose batteries to excessive heat such as sunshine, fire, etc. Dry batteries must not be recharged. Used batteries must not be disposed of as household waste.





Alignment

A Scope

B View point

C Scope mounting plate

D Prism head

E Receiver diode for remote control

F Charger socket (DC 9V)

G Battery charge indicator

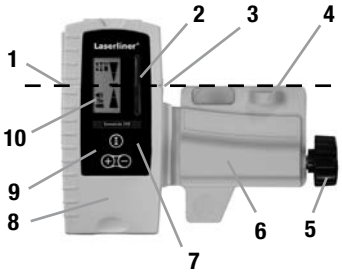
H 5/8" tripod thread (base)

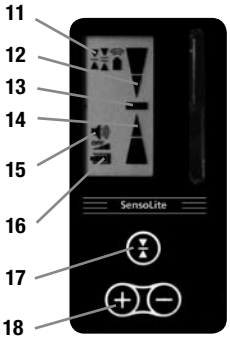
I LC-Display

J Control panel

K Battery compartment

Included accessory:
SensoLite 310
Protection class IP 66





Close-up of detector

1 All-round marking groove

2 Laser beam sensors

3 SpotLite Marking LED

4 Levelling vial

5 Clamping screw for levelling staffs

6 Universal mount

7 Binding screw (rear side)

8 Battery compartment (rear side)

9 Control panel

10 LC-Displays (front and rear side)

11 Display measuring range selection

12 Detector above laser level

13 Precisely on laser level

14 Detector below laser level

15 Volume indicator

16 Low battery indicator

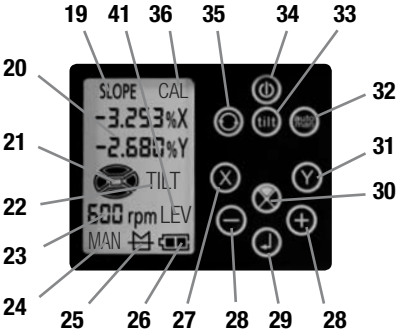
17 Detector mode /

Switch: Precision range

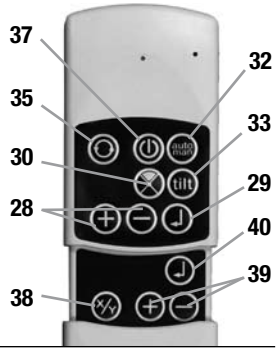
Free-hand range

18 Volume adjustment

LC-Display and control panel DualAxis-Laser



Commander DAL 50



19 Digital Slope function indicator

20 Digital slope adjustment X- and Y-axis indicator

21 Indicator of the laserbeam area

22 Tilt function indicator

23 Rotation speed indicator

24 auto/man function indicator

25 Sensor-Automatic indicator

26 Low battery indicator

27 Activate the slope adjustment of the X-axis / select data zone

28 Plus/minus-button for slope adjustment / selection of the laserbeam area.

29 Enter button

30 Set laserbeam area

31 Activate the slope adjustment of the Y-axis / select data zone

32 auto/man-function

33 Tilt-function

34 ON/OFF button DualAxis-Laser

35 Select rotation speed 0 / 300 / 600 / 1100 rpm

36 Calibration mode indicator

37 Activate standby mode on DualAxis-Laser. All settings are retained.

38 Calibration mode: switch X-, Y-axis

39 Calibration mode: adjusting axis

40 Enter button for calibration mode: save new setting

41 LEV: Laser out of level

sensor AUTOMATIC Sensor Automatic

The DualAxis-Laser is of the self-levelling kind. After it has been put in the required basic position, fine adjustment is being made automatically. Horizontal and vertical adjustments are made by the self-levelling system (SLS), while the X-axis and the Y-axis are scanned by two electronic measuring sensors. The working angle is ± 5°.

Digital slope adjustment:

With special slope sensors the operating plane can be inclined. The inclination of the X- and Y-axis can be adjusted separately up to 7,999%. The large LC-Display shows the exact values.

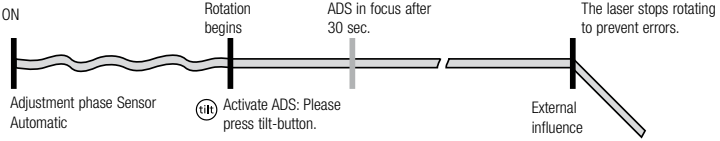
ADS tilt Anti-Drift-System (ADS) (tilt)

The Anti-drift system (ADS) is to prevent measurement errors caused by movement of the Laser or tripod. To activate the ADS press the "TILT" button after the Laser has been switched on. The TILT LED will flash and 30 seconds later the ADS becomes active. If the laser is now moved for any reason the ADS will stop the Laser and the TILT LED will illuminate continuously. This is to prevent further readings and possible errors until the unit has been suitably checked.

To cancel the ADS switch the Laser Off and then On.

Attention: The ADS-function will switch on the control of the laser 30 sec. after the laser has completely been levelled (adjustment phase). Tilt display (C) emits long blink signals during the adjustment phase and short blink signals when ADS is activated

Operating mode ADS:


ON
Rotation begins
ADS in focus after 30 sec.
The laser stops rotating to prevent errors.
Adjustment phase Sensor Automatic
(tilt) Activate ADS: Please press tilt-button.
External influence

⏻ Set-up

- Set the unit up on a surface that is as level as possible or fasten it to a tripod.
- Press the ON/OFF button (34) ⏻ on the rotary laser.
- The unit will level itself automatically to within ±5°. Once levelling is complete, the laser will rotate at a speed of 600 rpm. The speed can be modified (0, 300, 600, 1100 rpm) using the rotation button (35). ⟲ The laser will flash whilst the laser is being levelled.

  Important: The high measuring accuracy means that automatic levelling can take up to 3 minutes.
- **BackLight:** Press and hold down button (29) ◑ on the rotary laser for at least 2 seconds to switch the illuminated display on. Press the button again to switch it off.
- Press button 17 ⧗ to switch the SensoLite laser receiver on. The laser beam can now be received. Please note that the laser receiver will respond more quickly if the rotary laser is set to a higher speed.

Note: If the unit is set to an excessive angle (out of its 5° range), a warning signal will sound and the rotary head will stop turning. The unit must then be placed on a more level surface.

⏻ Standby mode

- The ON/OFF button (37) ⏻ on the Commander DA 50 can be used to switch the rotary laser to standby mode. All preset values are retained (highly recommended in digital slope mode).
- Note: If the rotary laser is switched off directly by pressing the ON/OFF button (34) ⏻ on the unit, all preset values will be deleted.

(tilt) Tilt function

- To protect the unit against drift due to external influences, you must activate the tilt function. To do this, press the tilt button (33) (tilt) (see the section about the anti-drift system for more information). "Tilt" (22) appears permanently on the LCD to indicate that the tilt function is active.

ADS Tilt

- Note: The tilt function is not active in standby mode and the unit is not protected against drift.

Ⓧ Ⓨ Digital gradient function:

In 1 plane

In 2 planes

- Deviation from the horizontal plane can be set digitally for the X and Y axes. The maximum slope in one plane is up to 7.999% and the sum of both axes may be up to 10% in 2 planes (X axis and Y axis). The values are displayed on the LCD and can be entered separately.
- To set the X axis: press the X button (27). Ⓧ The first digit of the value assigned to the X axis will flash on the LCD. Press the plus/minus buttons (28) ⊕ ⊖ to select a positive ("0") or negative ("-") value for this digit. Use the X button (27) Ⓧ to select the values of subsequent digits. Numerical values can be set using the plus/minus buttons (28). ⊕ ⊖ Press Enter (29) ↵ to confirm your entry once the entire value has been set. The unit will then apply the required value.
  Important: Value entry is disabled during levelling ("SLOPE" flashes on the LCD (19)). Once levelling is complete and value entry has been reactivated, "SLOPE" will stop flashing and will be displayed permanently on the LCD.

- To set the Y axis: press the Y button (31) Ⓨ and proceed in exactly the same way as when setting the X axis.
- Note: The automatic sensors are active for the digital slope function.

auto man Manual gradient function:

- The automatic sensors are not active when this function is selected. Significant deviations from the horizontal and vertical planes can now be configured. To do this, press the auto/man button (32) auto man. "MAN" appears on the LCD (24).
- Adjust the unit to the desired angle. The slope can be set easily using the optional tilt plate LLTP1.
- Important: Auto/man mode does not support horizontal levelling, since the automatic sensors are not active.

Laser modes

These modes can also be controlled with the Commander DAL 50 at distances of up to 50 m away from the unit. To insert the battery, open the compartment completely (as shown on the right). Make sure that you do not reverse the polarity. Replace and close the cover completely.

Laser Area Mode:

- The operating range of the laser beam can be divided into segments. The individual segments of the laser beam can be deactivated. This is important if a number of rotary lasers are in use on the same site.
- Use the segment button (30) to select the 4 segments and the plus/minus buttons (28) ⊕ ⊖ to activate or deactivate the required segment.
- Confirm the setting by pressing Enter (29). This will restrict the laser's active range to the required segments.

Rotary mode

You can use the rotation button (35) to set various speeds: Stop, 300, 600, and 1100 rpm.

Detector mode

Working with the laser detector: Press button 17 to switch the SensoLite laser detector on. Set the maximum speed of 1100 rpm using the remote control or on the rotary laser button (35).

The laser detector is now able to detect the laser beam reliably up to 300m. Move the laser detector up and down through the laser beam until the middle indicator (13) appears. Mark the measured height at the perimeter marking groove.

SpotLite Marking: The projected light beam at the height of the laser beam simplifies precise marking and prevents parallax errors.

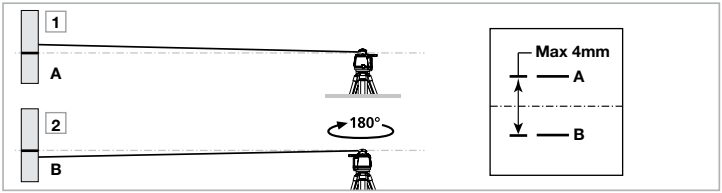
Calibration Check

To check the calibration of the LDAL310S Laser, place the Laser on a surface or preferably a tripod approximately 10m from a wall or post with the control panel away from the wall or post.

1. Switch on the Laser.

2. Mark the level point on the wall or post and label this point "A" using the detector.

3. Rotate the Laser on the surface or Tripod 180º. Be certain NOT to move or adjust the tripod. Mark the level point on the wall or post and label this point "B". You have now checked the "Y" axis.

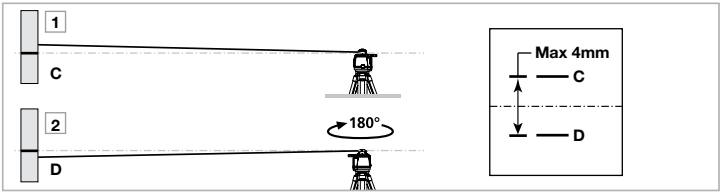


The point half way between points "A" and "B" is true level. If "A" and "B" are 4mm apart or less then no adjustment is required.

To check the "X" axis, rotate the level by 90º so that one of the sides is towards the wall or post.

4. Mark the level point on the wall or post and label this point "C".

5. Rotate the Laser on the surface or Tripod 180º so that the other side is towards the wall or post. Be certain NOT to move or adjust the tripod. Mark the level point on the wall or post



and label this point "D". You have now checked the "X" axis. The point half way between points "C" and "D" is also true level and should be the same as that noted for the "Y" axis above. If points "C" and "D" are 4mm apart or less then no adjustment is required.

Note the maximum adjustment is 20mm so if more than this is required then return the Laser to Cooper Tools service dept.

Resetting the calibration

1. To recalibrate the LDAL310S, firts perform the calibration check

Important: Use the buttons on the calibration panel.

2. During calibration, pay attention to the alignment of the axes on the LDAL310S. Always calibrate both axes.

3. Switch the device to calibration mode:
Switch off the LDAL310S, and then switch it on again while pressing the auto/man. button (32) by pressing the ON/OFF button friefly. Keep the auto/man. button (32) depressed until the message “CAL” (36) appears on the LCD display. You can toggle between the axes with the X/Y button (38) on the remote control. The laser begins to rotate as soon as the X/Y button is pressed.

4. Correcting the calibration:
Using the plus/minus buttons (39) ⊕ ⊖ on the remote control, you can move the laser up or down until the laser beam is at the True Level position midway between A & B or C & D as determined during the calibration check

5. Ending the calibration:

Save: The new calibration is saved by pressing the Enter button (40) ↵ on the remote control. After saving, switch off the LDAL310S. The new setting becomes active when the device is switched on again.

TIP: Save every axis individually.

Cancel: The entire calibration is aborted and the previous status is restored if the device is switched off before the Enter button has been pressed. ⏻

Note:
Regularly check the calibration before use, after transport and after extended periods of storage. Always make sure to check both axes.

X- / Y- axis

DualAxis-Laser	
Self-levelling range	± 5°
Adjustment speed	approx. 60 sec. on entire working angle
Precision	± 0,5 mm / 10 m
Horizontal levelling	automatic with electronic vials
Digital slope adjustment	X-axis = ± 7,999% Y-axis = ± 7,999% X-axis + Y-axis = ± 10%
Precision of the digital slope adjustment	± 3 mm / 10 m
Rotation speed	0, 300, 600, 1100 rpm
Remote control	Infrared IR
Laser wavelength	635 nm
Laser	Class 2 (EN 60825-1:2007-10)
Laser output rating	< 1 mW
Rechargeable batt. operating time	approx. 35 h
Non-rechargeable battery life	approx. 80 h, 4 x Typ D (Mono 1,5 V)
Battery recharging time	approx. 8 h
Operating temperature	-10°C ... + 50°C
Weight	5,2 kg
SensoLite 310 / Commander DAL 50	
Batteries SensoLite 310 / Commander DAL 50	1 x 9V battery each
Range Commander DAL 50	max. 15 m (IR-control)
Laser reception range SensoLite 310	max. 300 m
Operating temperature	-10°C ... + 50°C
Storage temperature	-10°C ... + 70°C

COOPER Tools

GUARANTEE

This product is guaranteed against any defect in material or workmanship for two years. Damage caused by abuse, improper use or excessive wear is not covered by this warranty. Claims should be returned to the place of purchase or returned prepaid to:

COOPER TOOLS PTY. LIMITED
Incorporated in N.S.W.
(A.B.N. 50 002 965 826)
519 Nurigong Street, ALBURY,
N.S.W. 2640 Australia